The Birth, Death and Survival of Exports in Zambia 1999 - 2011

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Abstract

This paper deals with the dynamics of Zambia's export performance, analyzing the birth, death and persistence of exporting in various products and destinations. We use a framework that has recently proliferated in international trade to decompose the growth of Zambia's exports into an "intensive" and "extensive" margin. Our results show that the extensive margin is the dominant driver of export growth in Zambia. We attribute the poor performance of the intensive margin to the low survival among exporters that hardly lasts for more than a year. Our findings imply that interventions to support new-exporting should be encouraged. But it also raises key questions on the sustainability of export growth in the long-run. Therefore, we propose that interventions should target improving the duration of survival among exporters and deepen their intensity of exporting once they are able to survive longer. In conclusion, there is urgent need to carefully understand the factors that are responsible for the high mortality among exporters within the first year of birth.

JEL Classification: **F10; F14; O12**

Key words: **Intensive margin; Extensive margin; Export survival; Export performance**

1.0. Introduction

This paper provides for the first time, a comprehensive analysis of Zambia's export performance in the twenty-first century. The analysis goes beyond the simple comparative assessments that have dominated much of the current studies and reports such as analyzing changes in year-on-year values of exports, concentration of exports in particular economic sectors and the performance of exports across key destinations. These kinds of assessments always neglect a tremendous amount of births, deaths and churning of exports that usually occur overtime and significantly affect export performance. Consequently, there is no existing study that has answered the following key question: should Zambia prioritize the export of existing products into existing markets (*called intensive margin*) or should it disproportionately encourage exports of new products and venturing into new markets (*called extensive margin*) in order to rapidly grow the contribution of its exports sector in the economy? The answer to this question is extremely critical in shaping national actions that aim to stimulate or sustain the growth of exports. This is the gap we intend to close in this paper.

From the outset, it is useful to indicate that Zambia has been recording significant economic growth on the fate of buoyant global demand for minerals since the twenty-first century commenced. Economic growth has risen from below 3% at the beginning of the century to almost 7% at the close of the 2000 decade. Current projections also indicate that the economy will continue to grow above 7% in the next two to three years. Broadly, the macroeconomic performance of the country is considered to be stable. The rate of inflation has remained at single digit levels while the fiscal deficit is considerably sustainable. The current account also consistently recorded substantial surplus for much part of the last decade.

At the backdrop of its stable macroeconomic environment, the country still struggles to reduce its vulnerability to traditional mineral exports and to further grow the value of the export sector. In 2011, the total value of exports reached US$ 9 billion which is the highest value ever recorded at about 48% of Gross Domestic Product. Although the country showed resilience during the global recession in 2008, the bitter memories of the global commodity shocks that occurred in the 1970 decade and adversely deteriorated its current account for over 25 years are still fresh in the minds of policy makers.

The eroding of most of its preferential market access in many leading markets such as Europe and the US adds a further dilemma on the sustainability and growth of the country's export sector. It is progressively being mentioned that the country will have to disproportionately depend more on locally mobilised funds to support its export growth interventions. Consequently, it is becoming increasingly important to equip decision makers with empirical evidence that should help them design more appropriate "value-for-money" interventions to support export growth. We believe that persuasive insights are best obtained by

examining micro-level data of exporters with respect to key exporting characteristics such as their capital endowment, product quality, technology and other export facilitators or barriers they encounter. Because useful representative micro-level data on exporting firms is not available, we resort to analyze customs transactions data collected from all exporters by the Zambia Revenue Authority.

The rest of the paper is organized as follows: Section 2 provides a review of research that investigates export performance along the intensive and extensive margins. Section 3 describes the data that we use in conducting the analysis and characterizes export performance. Section 4 describes the framework that guides our decomposition of export growth into the intensive and extensive margins. Section 5 provides some useful insights for policy and provides the concluding remarks.

2.0. Export Growth, Intensive and Extensive Margins: what do we know?

International trade experts are still split on how a country can substantially grow its value of exports overtime. Two divergent predictions form the nucleus of this debate. Predictions that depend on Paul S. Armington's (1969) national differentiation model emphasize the importance of the intensive margin: that is to say, a country should export more of its existing export products in destinations it has already established. On the contrary, models that are formulated on the notion of monopolistic competition á la Paul R. Krugman (1981) stress the importance of the extensive margin: that is to say, new product variety and an expanse of new markets will grow the value of a country's export sector rather than old products and markets.

There is growing evidence, albeit at the cross-country level, that emphasizes the dominance of the intensive margin in promoting export growth (Amiti and Freund 2010; Besedes & Blyde 2010; Besedes & Prusa 2011; Eaton et al. 2008; Helpman et al. 2008; Felbermayr and Kohler 2006). The leading argument is that although exporters incur sunk costs when they export for the first time either a new product or into a new market, they still tryout due to imperfect knowledge about profits. When they later discover that it is unprofitable, they withdraw thereby leading to a phenomenon of short lived firms, products and destinations in exports. This regularity of high births and deaths of exports has been found to be a characteristic of some African countries by Cadot et al. (2013). They show that the duration of exporting in Malawi, Mali, Senegal and Tanzania hardly exceeds the initial year for a given firm-product-destination triplet. High mortality in exporting does explain to some extent the weak contribution of the intensive margin over the extensive margin.

Cadot et al. (2013) attribute the long survival of exports to cross-firm externalities that emerge when a significant proportion of exporting is concentrated among exporters of the same

product from the same country of origin exporting in the same destination. This is because large numbers provide useful signals about profitability to new entrants and facilitates information spillovers to financial institutions. It also helps develop partnerships and strong bonds among exporters that are difficult to break.

On the contrary, Hummels and Klenow (2005) provide evidence that the extensive margin dominates the intensive margin in explaining the growth of exports. They estimate that over 60% of the growth in the value of exports in large economies can be linked to the extensive margin. However, they indicate that product quality has utmost importance in penetrating into new markets that generate most of the growth in the value of exports.

Our main objective in this paper is to assess the relative roles of the intensive margin and the extensive margin in explaining the country's export growth between 1999 and 2011. In general, the extensive margin refers to export growth due to new firms entering into the export market, new goods exported or new countries destined as export markets or a combination of these. On the other hand, export growth can come from increasing exports of existing firms, goods and markets, which is referred as the intensive margin. We characterize the extensive margin as the growth in exports attributed to new exporters i.e. those firms that did not export in the previous year but export in the current year while the intensive margin is captured by the growth in exports attributed to continuing exporters i.e. those firms that export in both the previous year and the current year.

While more empirical evidence is still being produced in many countries now, it is recognized that the relative importance of the intensive and extensive margins may well differ from one country to another even if the average picture across a group of countries is similar. As such, it is in the interest of every nation to inform its policy makers about the relative contribution of each margin within the local context. This is what we do in the rest of this paper.

3.0. Export Performance

3.1. Data

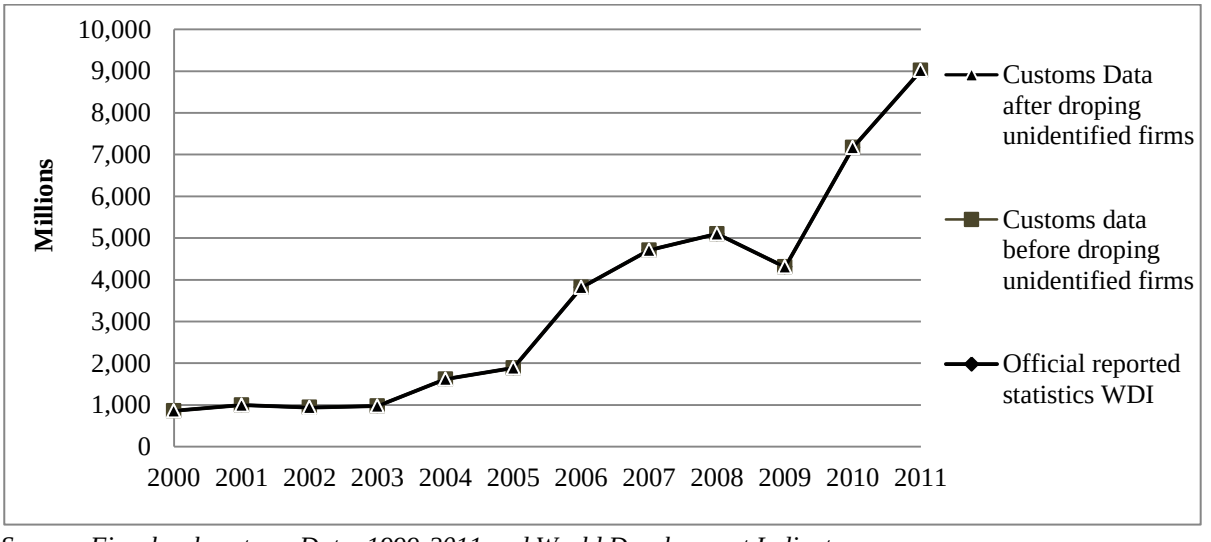
We use customs-level transaction data collected at all ports of exit by the customs authority, called Zambia Revenue Authority between 1999 and 2011. At the beginning of 1999, the manual processing of customs transactions was discontinued after a new electronic system called ASYCUDA was installed. This system collects export information relating to the identity of the exporter, the product being exported at the HS 8-digit classification, whether a product is a new export or it's a re-export, the destination of the export, its free-on-board value in US dollars, the net weight, the port of exit and the date on which exporting occurred.

In order to preserve the confidentiality of the exporters, we replaced original identifiers with artificial identifiers. At the same time, we aggregated products at the HS 6-digit level as done in many studies. There are some transactions that are captured without a unique exporter, product or destination identifier especially in the earlier years of ASYCUDA. A generic "other" code is entered to denote failure to uniquely identify such firms, products or destinations. Given the central importance of identifying each transaction by the exporter, the type of product and the destination of the export to our analysis, we first investigate if dropping these transactions may adversely affect the validity of our results.

Appendix 1 shows the proportion of transactions that do not have a unique non-missing firm, product or destination identifier in each year. The Table shows that it is mostly at the exporter level where unique identification is difficult although it has significantly declined overtime. Looking at the proportions that depend on the counts of the number of firms is not very informative. It is the value of exports that risks being lost when non-unique firms, products and destinations are dropped that has first-order importance.

Figure 1 shows the value of exports in each year before and after transactions that are not uniquely identified on firms, products and destinations are dropped. The Figure shows that unidentified transactions account for a very insignificant value of exports meaning that ignoring them altogether cannot adversely affect our analysis. Perhaps, it is the reason why customs authorities don't even hassle to uniquely identify them. We therefore dropped them in our analysis. We also show the official export values for Zambia reported in the World Development Indicators database. While our calculations include re-export transactions, the differences in export values are insignificant although we note there are a sizeable number of firms that only conduct re-exports. Specifically, 93% of the transactions are exports while only 7% are re-exports. In addition, re- exports constitute less than 1% of the total value of exports and re-exports.

Figure 1: Representativeness of Export value after dropping unidentified transactions

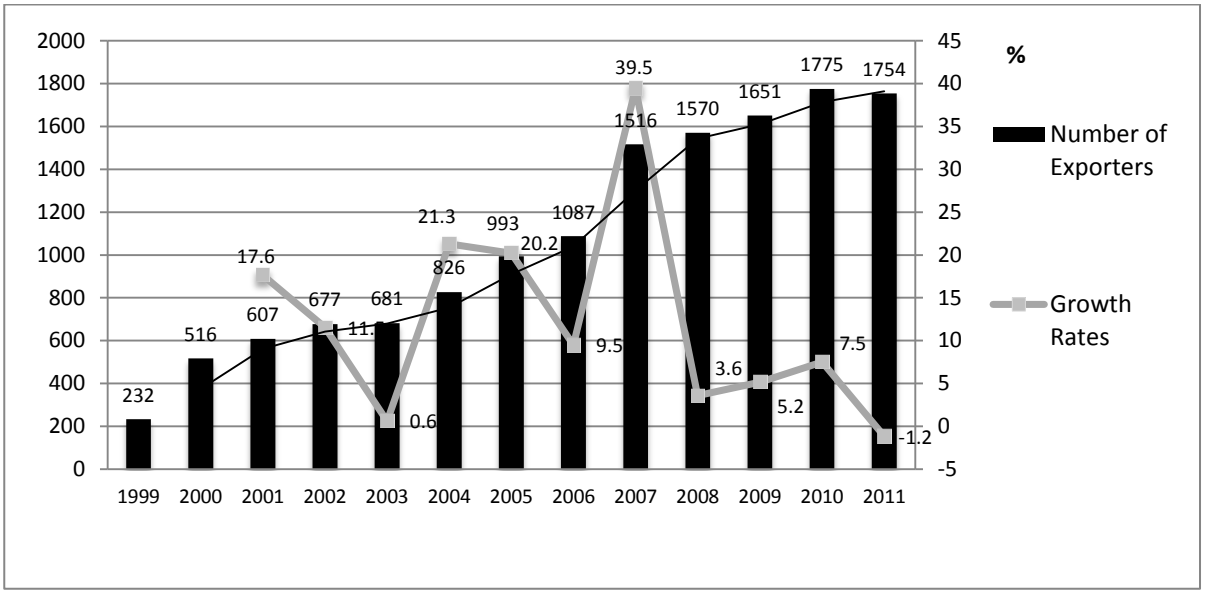


Source: Firm level customs Data, 1999-2011 and World Development Indicators

3.2. Growth of Exports

Zambia recorded progressive growth in the number of exporters between 1999 and 2011 as shown in Figure 2.The growth rate in 2000 has been omitted because it doesn't reflect the correct picture given a large number of firms are not uniquely identified in 1999 when ASYCUDA was introduced. In total, there are 5512 uniquely identified exporting firms in the data. The total number of exporters increased almost ten-fold from 232 recorded in 1999 to 1,794 in 2011. The growth in the number of exporters has been rising since 2003 except for a marginal decline of 1.2% between 2010 and 2011. However this growth has been very uneven with a sporadic peak of 39.5% between 2006 and 2007.

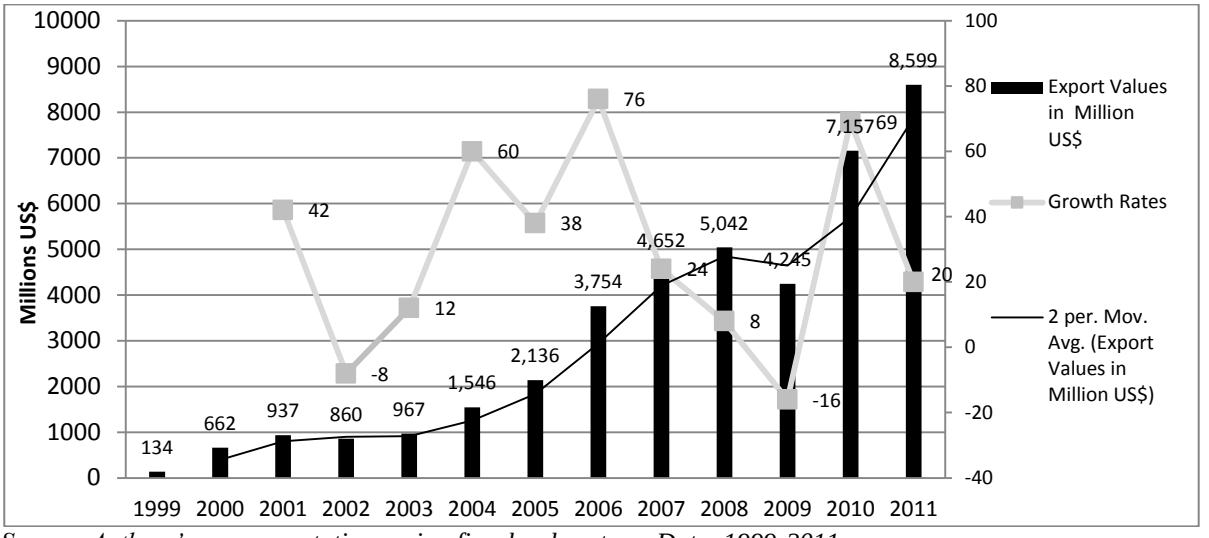
Figure 2: Number of Exporters in Zambia; 1999-2011



Source: Authors' own computations using firm level customs Data, 1999-2011

In terms of export values, the country recorded progressive levels of export revenue between 1999 and 2011 as shown in Figure 3. The total value of exports increased from $134 million in 1999 to $ 8,600 million in 2011. However, the growth in export revenues has been very volatile in tune with much of the volatility that affected the global economy in the first decade of the twenty-first century. The effects of the global financial meltdown are reflected in the continued drop in the value of the exports between 2007 and 2009 while the dampening of the adverse effects due to strong commodity demand that mainly emanated from china is reflected in the sharp rebound of the value of exports in 2010.

Figure 3: Total Value of Exports; 1999-2011

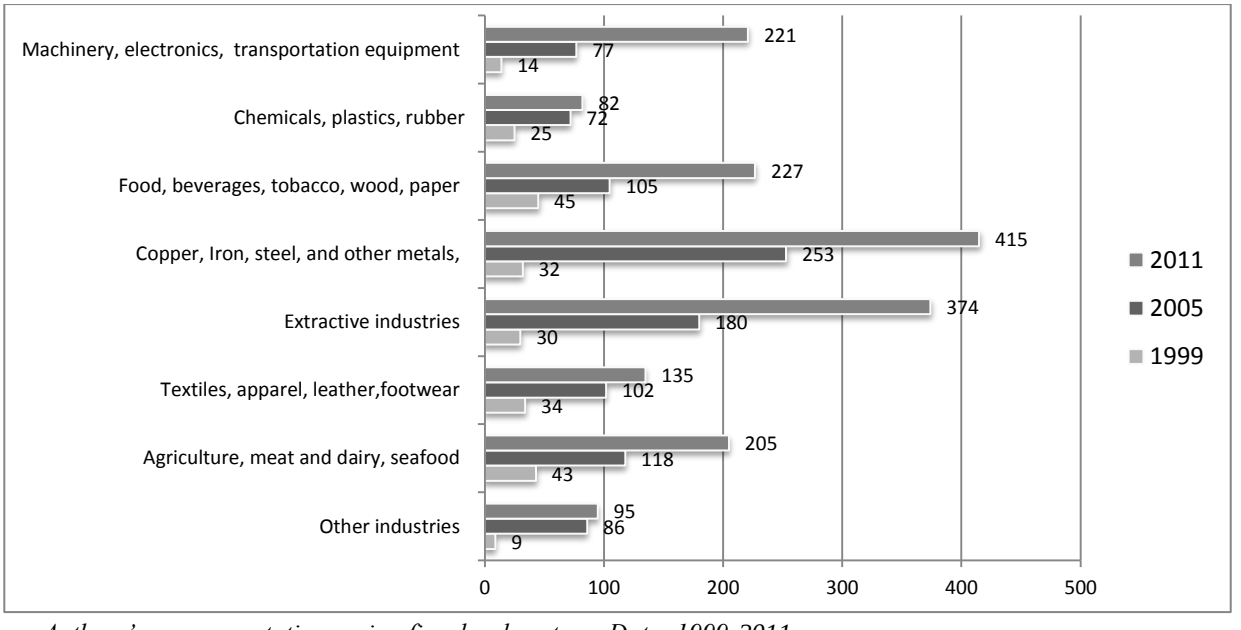


Source: Authors' own computations using firm level customs Data, 1999-2011

3.3. Export Diversification

The distribution of the number of exporters across sectors is shown in Figure 4. A total of 3,475 products were exported to 174 different destinations between 1999 and 2011 by firms belonging to one or more of the eight economic sectors formed by aggregating product chapters as shown in Appendix 2. The highest number of exporters is in mineral exporting, the country's traditional export since it gained independence in 1964.

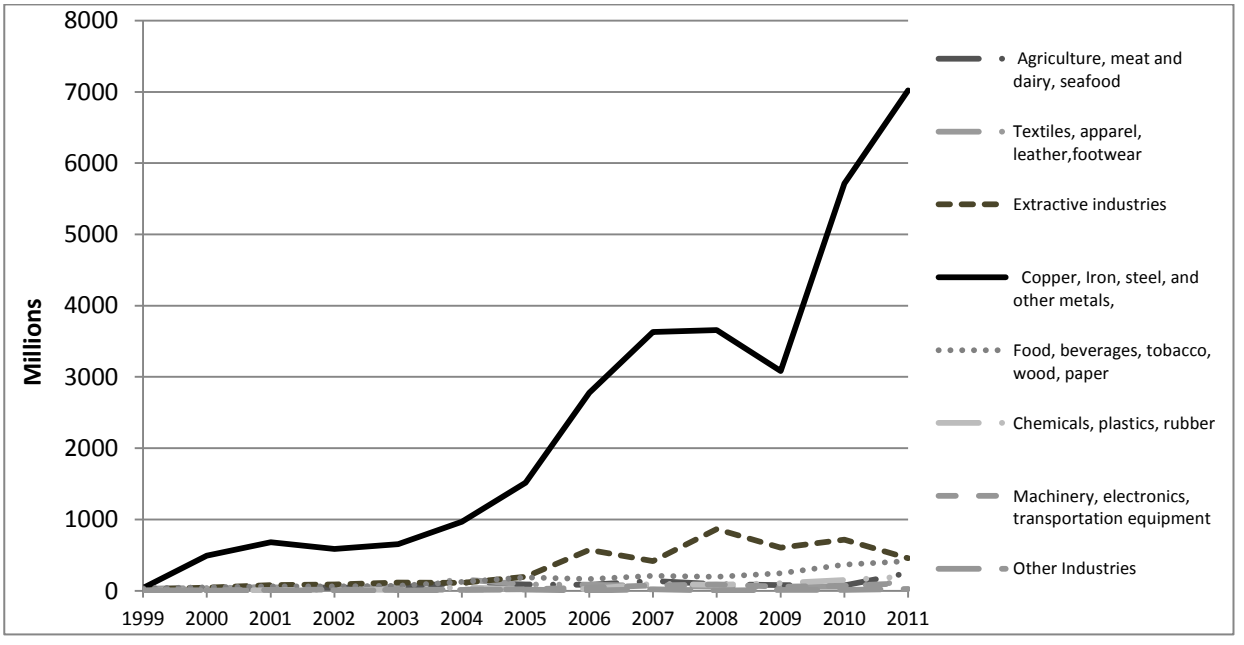
Figure 4: Number of Exporters by Sector



Source: Authors' own computations using firm level customs Data, 1999-2011

The same picture persists when it comes to the value of exports by economic sector shown in Figure 5. The role of minerals tremendously magnifies and heavily dominates in the value contribution to export performance in Zambia. This motivates the discussion on enhancing the value of exports in the non-traditional sectors to mitigate risks that tend to engulf traditional (metal) exports during periods such as the current global recession.

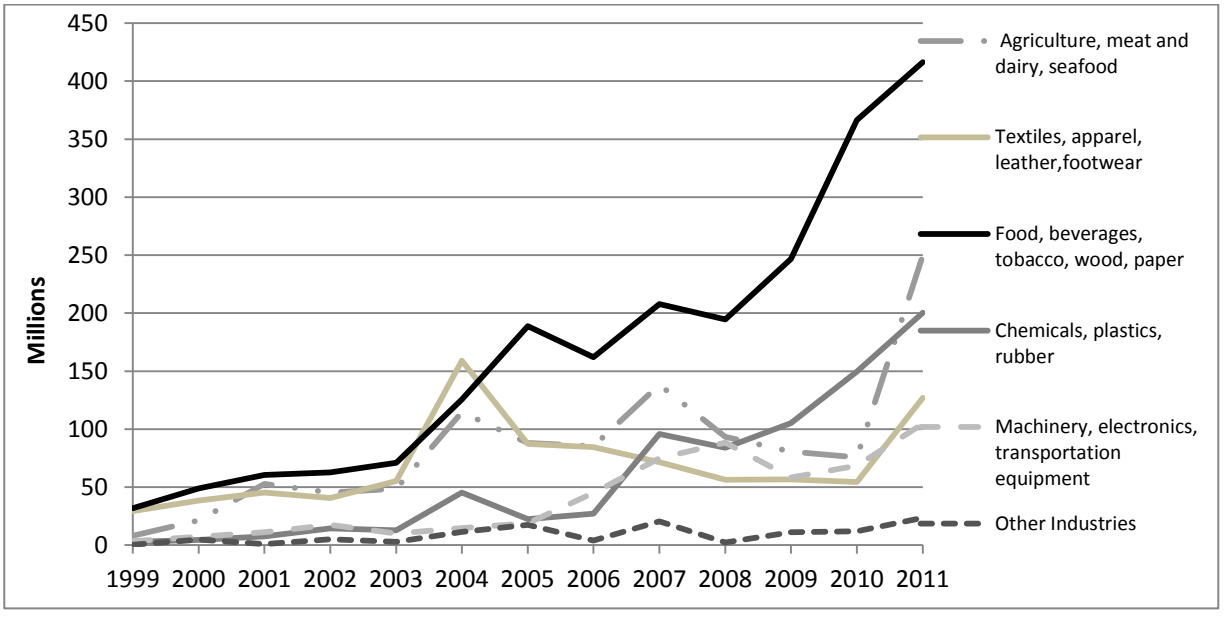
Figure 5: Value of Exports by Sector; 1999 - 2011



Source: Authors' own computations using firm level customs Data, 1999-2011

Because the role of Non-Traditional Exports (NTEs) is overshadowed in Figure 5, we separately show the value of exports contributed by NTEs in Figure 6. Particularly, the value of exports in the food, beverages, tobacco, wood and paper sector grew relatively faster than the other non-traditional sectors. However, the increases recorded in all the non- traditional sectors were not substantial enough to match the value that is derived from the traditional minerals sector.

Figure 6: Value of non-traditional Exports by sector; 1999 - 2011

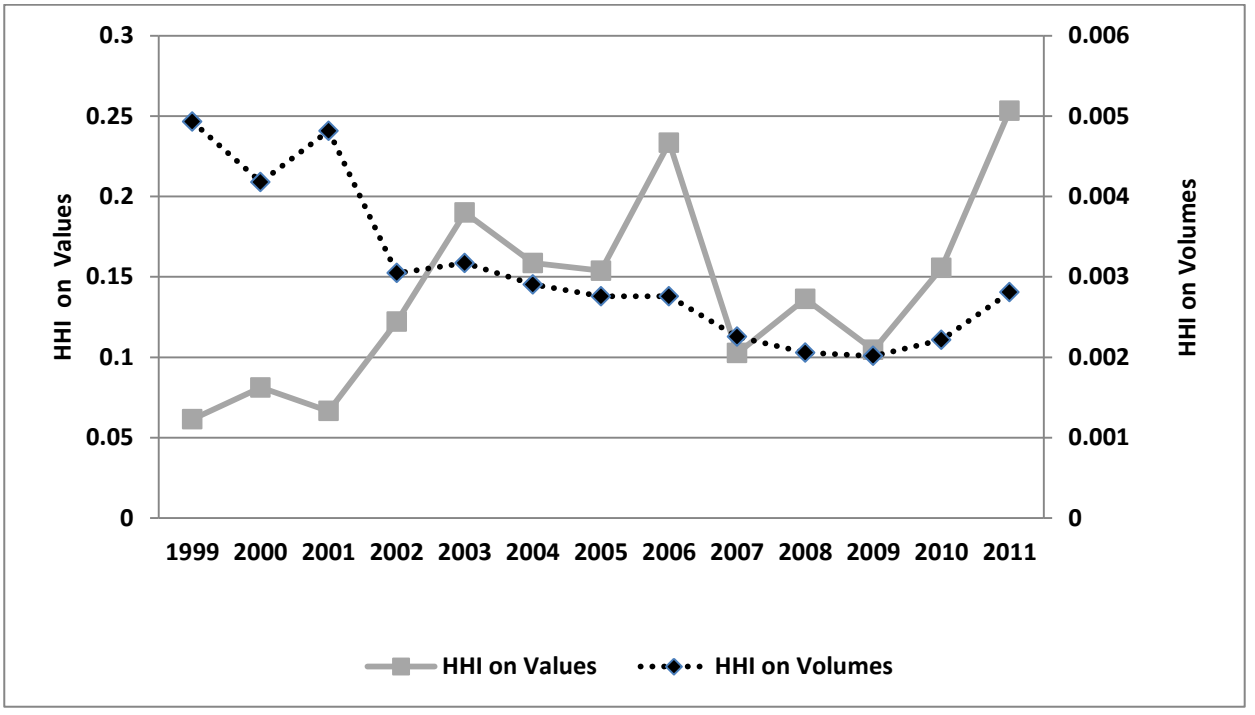


Source: Authors' own computations using firm level customs Data, 1999-2011

Beyond graphical depiction of how Zambia's exports are distributed, we formally measured the concentration of exports into particular products and markets using a widely used indicator called the Herfindahl (HH) Index. This index is computed as the sum of squared shares of each product or market in total exports of a country and its value lies between 0 and 1. A value that is close to 1 means that there is high concentration of exporting into very few products or into very few destinations. At the extreme only one product or one destination account for all the export earnings. On the contrary, a value of 0 on the index means none of the products or destinations dominate in the national export earnings.

With a total of 3,475 products exported, the HHI hardly exceeded 0.01 on the number of products for all the years. This shows that neither product dominates in the number of times it crosses the border. In terms of the contribution of each product value, the HHI doesn't exceed 0.33 which indicates non-dominance of any particular product in contributing to the value of exports as shown in figure 7. This is simply because at the 6 digit HS classification, even the mining sector which dominates in value has extremely heterogeneous products.

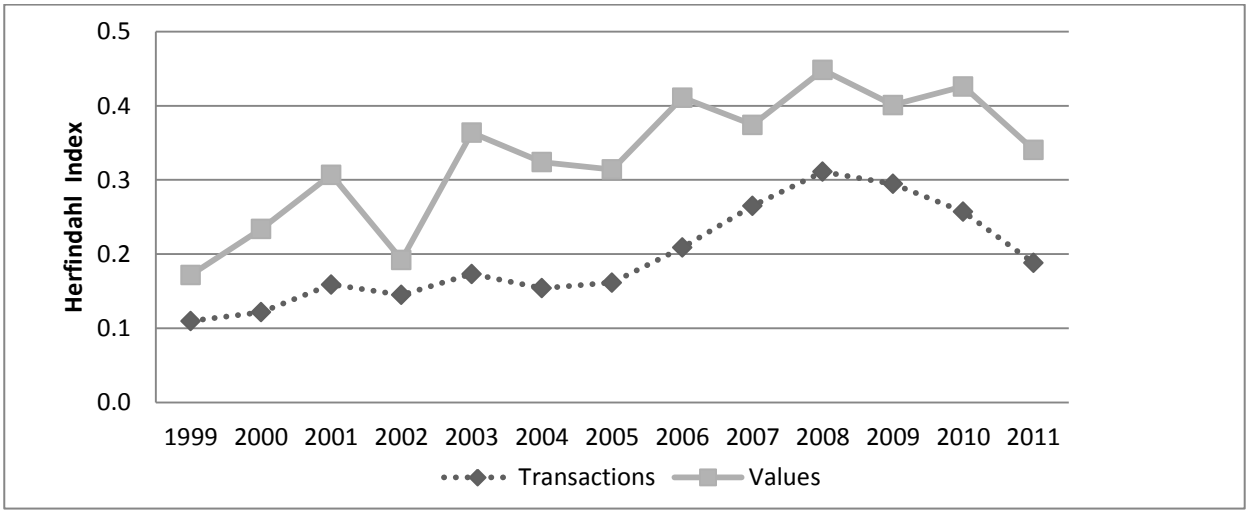
Figure 7: Herfindahl Index across Products; 1999-2011



Source: Authors' own computations using firm level customs Data, 1999- 2011

With regard to export destinations, our data shows that Zambia exported into 174 unique markets over the period rising from 53 in 1999 to 109 in 2011. The average number of firms per destination also rose from 4 in 1999 to 16 in 2011. Figure 8 shows the concentration in the value of exports across destinations and the number of transactions. In particular, it shows that exporting until 2008 increasingly targeted a narrow volume of markets but exporters rapidly increased the number of destinations thereafter which leads to an inverted-U shape of the plot. This indicates that during the good times value could easily be obtained from a subset of markets whereas during and after the peak of the financial crises in 2008 and 2009, firms had to create value from an expanse of markets leading to a decline in concentration. It is also clear that a sizeable number of exporters withdrew in 2008 as shown in figure 2 with firms concentrating in fewer markets as highlighted by the peak in the HHI across export destinations in the same year.

Figure 8: Herfindahl Index across Export Destinations

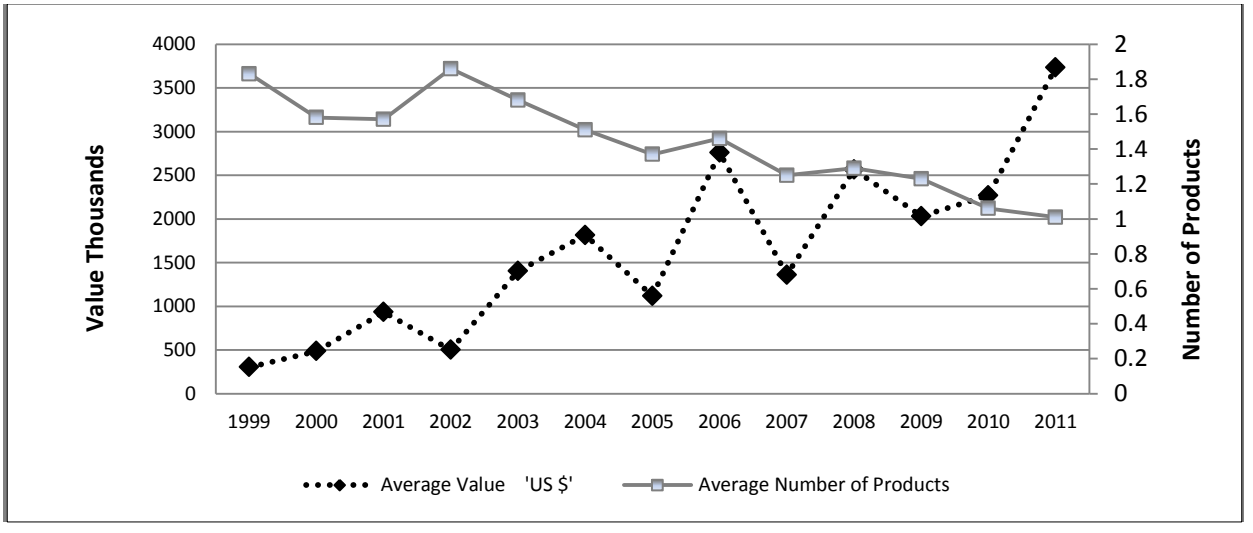


Source: Authors' own computations using firm level customs Data, 1999-2011

3.4. Export Performance at the Firm Level

The average value of exports per firm progressively increased from US$ 302,892 in 1999 to US$ 3,734,123 in 2011 as shown in Figure 8. On the other hand, the number of products exported per firm decreased from 1.8 in 1999 to 1.0 in 2011. These findings point to some level of specialization at the firm level overtime which has translated into higher returns. It could be argued that the higher returns stem from improvements in productivity or efficiency as well as the acquisition of niche products and markets overtime.

Figure 9: Export performance at Firm level; 1999- 2011



Source: Authors' own computations using firm level customs Data, 1999-2011

4.0. Births, Deaths and Survival of Exports

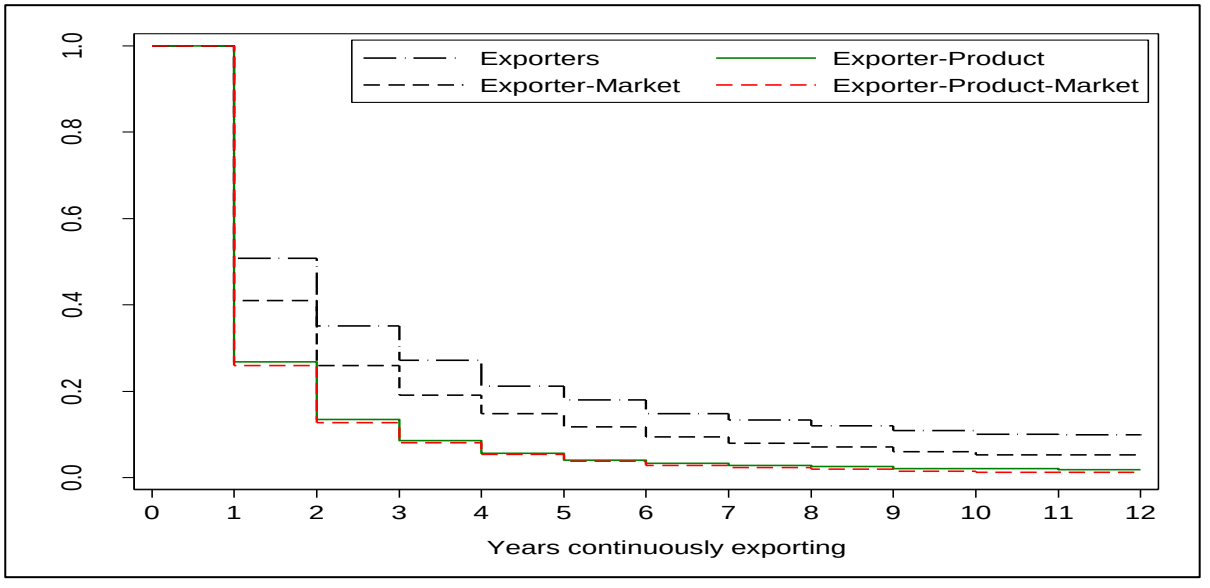
In this section, we describe the births, deaths and survival of exporting generally, then exporting a particular product or exporting into a specific destination and a combination of exporting a particular product into a particular destination using time-to-event statistical methods. For each case specified above, we measure a spell at the exporting firm level as any continuous occurrence of the event overtime. For example, if we consider the first case of merely exporting without paying attention to the product or destination, then a firm that exports in each year between 1999 and 2011 has one spell whose length is 12 years of exporting. On the contrary, a firm that exports for the first time in 2002 and then skips exporting in 2003 and 2004 but exports again between 2005 to 2009 is captured as having two spells of lengths 1 and 4 years of exporting respectively. This means that any discontinuity in any of the years leads to a new spell for each firm.

In total, 79% of all firms have only one spell meaning that they exported in every subsequent year from the time they started exporting until the time they exited if earlier than 2011. When only the longest spell is analyzed per exporter, approximately 81% of the 4,394 spells or exporters have duration of not more than 2 years. The average duration of these longest spells per exporter is 2.06 years with a standard deviation of 2.3 years. The high proportion of single spells indicates that there is very minimal erratic (exit and re-entry or discontinuous) exporting overtime. In fact, having more than three discontinuities per exporter is almost zero. It is useful to notice that analyzing the longest spell per firm that results in examining only one spell per exporter amplifies the observation of short survival simply because the duration of the longest spell is short and the denominator also trims other (shorter) spells away. This contrasts the case of our Kaplan-Meier analysis where all spells irrespective of their length are used. As a result, each firm-spell pair is treated as a separate observation and heavily weighs the denominator. This explains the higher than observed proportion of short duration in exporting reported in this paragraph when compared to the estimate from the Kaplan-Meier model.

The results of the Kaplan-Meier survival estimates for each exporting case specified in the first paragraph of this section are shown in Figure 9. There are a number of remarkable points from these results. First, and as demonstrated in most settings, the duration of much exporting, with or without regard to products and destination, is remarkably short. More than half of exporting regardless of the product or destination will die within the first year of commencement. Second, survival in destinations is much higher than survival in products while surviving in the same product and destination is the most hardest. The strain to survive in specific export products might carry a signal that indicates stiff competition and maybe the challenges of maintaining quality in the products being exported.

This contrasts to some advantages that are often embedded in destinations such as short distance and preferential access. Since exporters incur sunk costs at start-up, the high likelihood of failure within the first one or two years, means that they do lose quite a significant amount of financial and other resources. This may be a source of worry to some people but it might also be viewed by others including exporters as an efficient outcome given the peculiarities that tend to exist either in the markets or within the local production structure of exports. However, it raises a key question of sustainability about what will happen when all markets have been tried.

Figure 9: Survival of Export Products and Destinations for all Exporters from 1999 to 2011



Source: Authors' own computations using firm level customs Data, 1999-2011

While it can be argued that the high death rate within the first year of exporting can possibly mute the impact of the intensive margin on long run export growth, it is however, the structure or patterns of deaths and births and hence survival that matters over a longer period of time. Deaths and births do not occur in the first year of exporting alone. Table 1 shows the demographic structure of Zambia's exporting indicating the births, death and survival per 100 spells. The Table reveals an enormous amount of similarity in births deaths and survival occurring from 2001 onwards. In this table, deaths are measured by the exit of a firm from exporting while births refer to the entry of firms in exporting. Despite the similarity in the export population components, we investigate the relative value of each of these components in order to discern the relative contribution of the intensive and extensive margins in the next section.

Table 1: Births, deaths and survival of exporting per 100 spells per year

Year	Total Births	Birth Rate	Total Deaths	Death Rate	Total Survivors	Survivor Rate
1999	232	100	72	31	160	69
2000	356	69	226	44	290	56
2001	317	52	261	43	346	57
2002	331	49	295	44	382	56

2003	299	44	272	40	409	60
2004	417	50	327	40	499	60
2005	494	50	387	39	606	61
2006	481	44	386	36	701	64
2007	815	54	644	42	872	58
2008	698	44	703	45	867	55
2009	784	47	739	45	912	55
2010	863	49	895	50	880	50
2011	874	50	1754	NA		NA

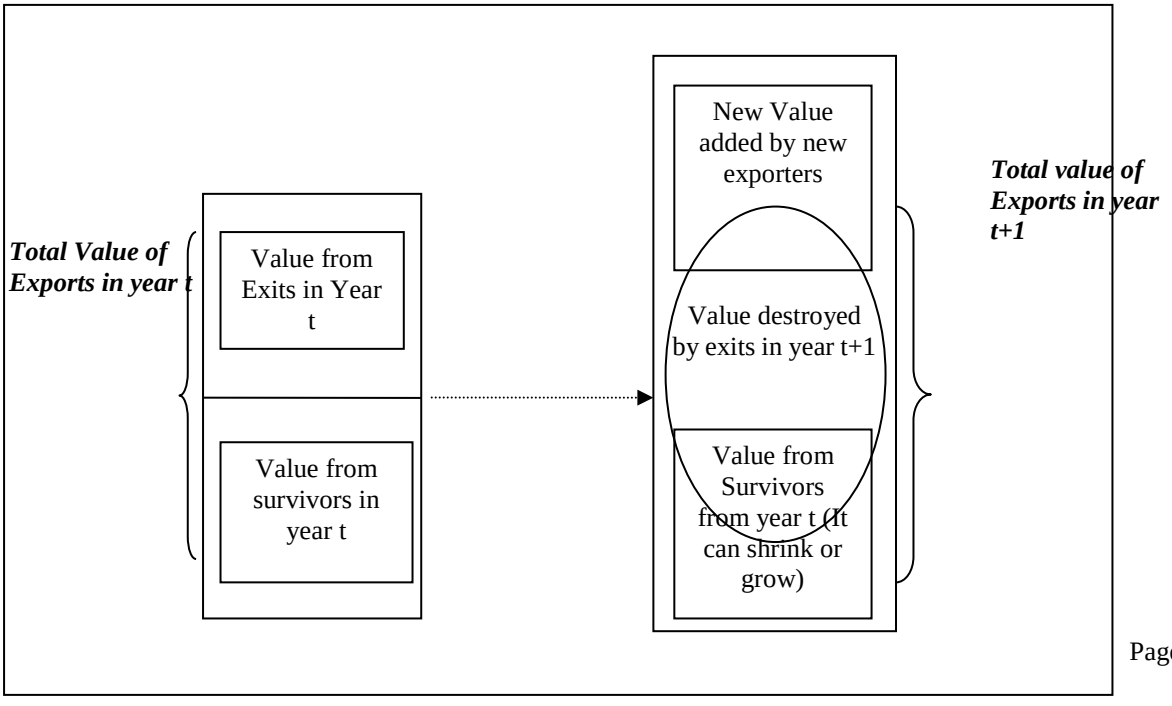
Source: Authors' own computations using firm level customs Data, 1999-2011

4.0. Decomposing Export Growth into Intensive and Extensive Margins

4.1. Methodology

We decompose the growth in exports using the growth accounting framework presented in Besedes and Prusa (2011). This framework is increasingly being used to perform export decompositions. Minondo and Silvente (2012) used this approach to decompose differences in growth of exports among Spanish regions. In this framework, the growth in exports originates from the birth of new exports and the additional value carried by exporters that survive from one period to another. The death of exporters in a particular year reduces the value of exports from one year to another. If surviving firms or products or destinations cannot generate additional value that is more than what new firms or products or destinations are generating in a given year, the extensive margin will dominate the intensive margin. In this respect, there are three building blocks to the analysis: these are value of entrants, the value of exits and the value of survivors called deepening. We present an illustrative depiction of the export growth accounting framework in figure 10 below:

Figure 10: Export Growth Accounting Framework



In any year denoted t, the total value of exports irrespective of the product or destination denoted V_t, is the product of the average value of exports per firm denoted v_t, and the total number of firms in year t, denoted n_t. This can be expressed in a mathematical equation as;

$$V_t = n_t v_t \qquad (1)$$

Because the number of exporters consist of exporters that survive (s_t) from a given year t into the next year t+1 and new exporting firms that commence in year t+1, denoted x_{t+1}, we can express the number of exporters in year t+1 as a sum of survivors from the current year and those that are born in the next period (i.e. $n_{t+1} = s_t + x_{t+1}$). Using simple algebra, it can be shown that the growth in the value of exports between these two periods t and t+1 is given by;

$$V_{t+1} - V_t = \underbrace{(x_{t+1}\, v^0_{t+1})}_{\text{Extensive margin}} + \underbrace{[(sn_t)(v_{t+1} - v_t) - \big((1-s)n_t v_t\big)]}_{\text{Intensive margin}} \qquad (2)$$

where V is the total value of exports, obtained by multiplying the number of trade relationships (n) by the average value of a trade relationship (v). The term x_{t+1} is the number of new exporters and v^0_{t+1} is the average value of exports among new exporters; s is the survival rate of the exporters and is defined as the probability that the export relationship does not fail in year t.

The absolute growth in exports now has the three components that we are interested in. The first term in equation (1) represents the extensive margin $(x_{t+1}\, v^0_{t+1})$ which gives the total value originating from new exporters in year t+1. The second term takes into account that exporters are prone to a death hurdle in any given year. It also takes care of the additional value, which can be negative as well, that is generated by exporters that survive into the next period. The survival component gives the proportion of exporters that survive between year t and year t +1 and the deepening component is the absolute increase in the value of surviving exporters. The third term $\big((1-s)n_t v_t\big)$ is the failure component. It gives the total value of those exports that is lost between year t and year t+1 as a result of exporters that die. The combination of the last two terms yields the intensive margin of exports growth, that is, the net change in export value that stems from the survival and death from previous year.

When equation (1) is divided by V_t, the result is a proportionate change in the value of exports between any two years that can be expressed into a percentage growth rate (g) by easily multiplying it by 100 given as:

$$g_{t+1,t} = ef + sd - (1 - s) \quad (3)$$

where e is the entry rate: $\frac{x_{t+1}}{n_t}$, which is the number of new exporters relative to the number of exporters in year t; and f is the extensive value rate: $\frac{v^0_{t+1}}{v_t}$, which gives the average value of new exporters relative to the average value of exporters in year t; d is deepening rate: $\frac{v_{t+1}-v_t}{v_t}$, which gives the rate of increase of the average value of exports that survives; Like before, s denoted the survival rate.

Since the growth decomposition is expressed in relative terms, the extensive margin is now decomposed into a volume (*e*) and a value (*f*) component. This decomposition, which is an extension by Minondo et al. (2012), enables us to investigate what drives exports growth at the extensive margin: is it the capacity to have a large number of new exporters or is it the ability to commence exports that have high value?

4.2. Results

Table 2 shows the percentage contribution of the extensive and the intensive margins to the total growth in the value of exports. The comparison of column 2 and 3 shows that it is the extensive margin that significantly drives the growth in exports. In particular, the country experiences high levels of entry into export markets with high export values. The extensive value rate is relatively higher than the entry rate in most of the years as shown in Appendix 3. This implies that the extensive margin in itself is largely driven by the relatively high value of exports introduced by new entrants.

Table 2: Decomposition of Export growth; 2000- 2011

Time	Intensive Margin sd-(1-s)	Extensive Margin (ef)	Actual Growth g=ef + sd-(1-s)
2000-2001	-32%	74%	42%
2001-2002	-53%	45%	-8%
2002-2003	-37%	49%	12%
2003-2004	-21%	81%	60%
2004-2005	-31%	69%	38%
2005-2006	-2%	78%	76%
2006-2007	-43%	67%	24%
2007-2008	-40%	48%	8%
2008-2009	-56%	40%	-16%
2009-2010	-13%	82%	69%
2010-2011	-40%	60%	20%

Source: Authors' own computations using firm level customs Data, 1999-2011

Zambia's export performance on the intensive margin is relatively poor, mainly owing to low survival rates and a decline in export deepening. Specifically, the country's poor performance on the intensive margin can mainly be attributed to the decline in export values for firms that survive and to some extent the value lost to firms that exit the export market. The year on year survival rates mainly lie between 50% and 60% while the deepening rates are mostly very low and in some cases negative. This implies that almost half of the exporters in any particular year exit the export market by the following year while the surviving firms tend to record a decline in the value of their exports in the subsequent years they continue to exist.

These findings are similar when replicated at the sectorial level as shown in Appendix 4. We observe that the role of the extensive margin dominates the growth of exports across all the sectors. In most years, the intensive margin is negative indicating a decline in the value of exports for surviving firms in subsequent years of exporting. On average survival rates are similar across all sectors ranging between 50% and 60% except for the Machinery, Electronics and Transportation Equipment sector where survival rates over the period are very low, on average 39%.

These results indicate that much of the export growth has been explained by the number of new entrants into the export markets and the value of their exports. However, the low survival of exporters in the subsequent years is a key limitation to this growth. It will be imperative for Zambia to sustain its new export relationships beyond the first year in order to have meaningful impact on export growth. In addition, the impact of deepening on export growth has been very minimal during the reference period. It will thus be important to enhance the deepening of existing trade relationships in order to enhance the impact of the intensive margin on export growth.

5.0. Conclusion and Policy Remarks

In this paper we take a disaggregated look at the differences in the growth of aggregate exports using customs data covering the period 1999 to 2011 obtained from the Zambian customs authorities, the Zambia Revenue Authority (ZRA). We find that the duration of firms in exporting is very brief implying a high hazard rate among exporters. Our analysis finds that more than half of Zambia's export relationships do not survive beyond two years. In addition, the absolute value of exports lost as a result of firms failing to maintain export relationships is greater than the absolute value of exports from surviving firms. However, it is interesting to note that the value of exports from new entrants is remarkably larger than the other two constituents. However, the new entrants have little significance to long run export growth because of the low survival of export relationships.

We extend our analysis to decompose the growth of exports during the reference period into two constituents, the extensive margin and the intensive margin following the methodology proposed by Besedes and Prusa (2011) and extended by Minondo et al. (2012). Our results show that the extensive margin plays a larger role in driving the growth of exports in Zambia. Particularly, the role of new entrants into export markets plays a significant role in the growth of exports. In most of the years covered in the reference period, the intensive margin is negative implying a decline in the value of exports by continuing firms and a high hazard rate.

From a policy perspective, the findings of this paper are useful in providing a rationale for the use of public resources in supporting the private sector through export promotion interventions. Specifically, Zambia urgently needs to address the challenges associated with the survival of exporters beyond the first year. In addition, efforts must be made to enhance the growth of export values for surviving exporters. These should mainly be centered on improving conditions and events surrounding a firm's export activities, including, for example, customs and trade facilitation, access to credit, and the tax and procedural environment.

Finally, our results must be taken with caution when applied to policy. This paper is not an attempt to uncover the underlying causes of poor export survival. Unless a qualitative assessment is made to identify the underlying bottlenecks that could include but not limited to the business environment, trade facilitation or structural reasons such as infrastructure, it is not clear how survival could be improved and at what cost. However, the paper has highlighted the important role the extensive margin plays in driving export growth in Zambia as well as the scope for enhancing the growth of the country's exports through the intensive margin.

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Appendix 1

Transactions with valid and missing exporter IDs

Year	Total Transactions	Percentage missing IDs	Percentage missing product Code	Percentage missing destination
1999	4897	74%	1.00%	0.04%
2000	4627	48%	2.10%	0.02%
2001	4841	39%	1.20%	0.08%
2002	6145	31%	0.00%	0.05%
2003	4597	25%	0.00%	0.02%
2004	5039	20%	0.00%	0.02%
2005	6279	15%	0.40%	0.02%
2006	7161	12%	0.00%	0.00%
2007	10154	10%	1.60%	0.01%
2008	11798	8%	2.30%	0.00%
2009	12724	8%	2.00%	0.02%
2010	12209	6%	2.20%	0.00%
2011	9099	5%	2.80%	0.00%

Appendix 2

Classification of Economic Sectors

Sector	Name	HS Chapters Included
1	Agriculture, meat and dairy, seafood	HS 1-10, 12-14
2	Textiles, apparel, leather, footwear	HS 41-42, 50-65
3	Extractive industries	HS 25-27,68-71
4	Other industries	HS 37, 43, 49, 66-67, 90-97, 98
5	Copper, iron, steel, and other metals	HS 26, 72-83
6	Food, beverages, tobacco, wood, paper	HS 11, 15-24,44
7	Chemicals, plastics, rubber	HS 28-36,38-40
8	Machinery, electronics, transportation equipment	HS 84-89

Appendix 3

Export Growth Decomposition Components

Time	Survival Rate	Deepening Rate	Entry Rate	Extensive Value Rate	Actual Growth
1999-2000	69%	189%	153%	289%	392%
2000-2001	56%	12%	61%	112%	42%
2001-2002	57%	-42%	55%	58%	-8%
2002-2003	56%	275%	44%	375%	12%
2003-2004	60%	-68%	61%	32%	60%
2004-2005	60%	65%	60%	165%	38%
2005-2006	61%	175%	48%	275%	76%
2006-2007	64%	-85%	75%	15%	24%
2007-2008	58%	152%	46%	252%	8%
2008-2009	55%	-51%	50%	49%	-16%
2009-2010	55%	130%	52%	230%	69%
2010-2011	50%	12%	49%	112%	20%

Appendix 3: Export Growth Decomposition Components: 2000 - 2011

Sector	Margin	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Agriculture, meat & dairy, seafood	IM	49.6%	-51.9%	-12.1%	23.1%	-57.8%	-10.9%	-22.2%	-44.1%	-55.2%	-44.1%	91.6%
	EM	93.2%	34.5%	37.3%	115.2%	13.8%	44.1%	50.2%	29.6%	35.1%	38.0%	138.4%
Textiles, apparel, leather, footwear	IM	27.7%	-71.7%	39.8%	61.1%	-85.2%	-25.8%	-4.5%	-30.3%	-56.7%	-29.7%	38.6%
	EM	57.0%	24.0%	98.4%	132.3%	9.6%	38.9%	51.8%	17.9%	24.8%	25.4%	95.3%
Extractive industries	IM	7.1%	-44.1%	-8.7%	-43.9%	-34.2%	185.2%	-70.6%	45.0%	-73.1%	-44.2%	-65.9%
	EM	179.3%	52.0%	58.8%	37.8%	50.4%	130.9%	43.0%	93.4%	31.1%	61.9%	29.1%
Other industries	IM	-94.5%	174.6%	-86.6%	104.0%	-25.5%	-81.5%	144.6%	-93.2%	158.0%	-36.6%	-1.0%
	EM	9.9%	420.0%	16.1%	340.0%	74.5%	14.0%	277.2%	4.7%	160.6%	44.7%	96.9%
Copper, iron, steel & other metals	IM	-70.8%	-70.8%	178.4%	-32.9%	-69.3%	48.1%	-71.9%	-10.0%	-69.9%	-19.7%	-6.5%
	EM	34.0%	36.1%	287.2%	81.1%	52.8%	146.1%	33.6%	84.5%	38.3%	68.5%	84.5%
Food, beverages, tobacco, wood, paper	IM	-20.3%	-66.9%	8.6%	-16.0%	-47.3%	-20.4%	-50.5%	-44.6%	-61.1%	-35.7%	-50.4%
	EM	109.3%	27.3%	89.0%	96.7%	47.9%	45.3%	80.0%	38.6%	71.7%	84.3%	64.1%
Chemicals, plastics, rubber	IM	-16.5%	-3.2%	-56.4%	77.2%	-82.6%	-10.3%	65.4%	-49.0%	-42.0%	-22.4%	-29.7%
	EM	83.5%	96.8%	54.9%	189.0%	18.4%	75.9%	190.4%	48.8%	71.4%	64.4%	63.8%
Machinery, electronics & transportation equipment	IM	6.2%	-39.0%	-69.6%	-51.4%	-83.0%	16.0%	-39.3%	-59.5%	-90.8%	-60.0%	-50.9%
	EM	278.8%	97.6%	34.2%	97.2%	48.6%	355.6%	105.2%	77.8%	45.6%	77.2%	103.8%

Notes: IM is Intensive Margin, EM means Extensive margin